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ABSTRACT

An educational testing program at the University of Pittsburgh (Pennsylvania), developed for juniors entering its school of education, evaluates their characteristics, the nature and extent of subject matter weaknesses, the need for and nature of remediation, and the relation of subject matter and basic skill achievement to success in methods courses. Three standardized tests are used: (1) the Nelson-Denny Reading Test, which provides standardized scores on vocabulary and reading comprehension, accompanied by tests in oral English and writing; (2) the Sequential Tests of Educational Progress (STEP) II Science Test, which determines general scientific literacy; and (3) the Iowa Test of Basic Skills, which assesses students' competency in skills needed to teach children social science. A fourth test was developed to assess competency in mathematics taught in the elementary school. Additional standard tests are used to measure students' attitudes toward classroom control, orientation toward reinforcement, and cognitive skills. A report is given on the data obtained from testing 123 prospective education majors, including a narrative analysis and illustrative tables. The value of the testing program in determining where remedial work is needed is discussed. (JD)

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Ascertaining Learning Needs of Students Entering an Upper Level Teacher Education Program

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Beginning with Fall Term 1980, the Early Childhood and Elementary Education Programs at the University of Pittsburgh began collecting information and test results on students entering teacher preparation programs. A variety of questionnaires, surveys, tests and student records have been used to provide a data base for longitudinal studies of teacher development as students progress through the programs.

Students enter the School of Education as juniors. The criteria for admission are a grade point average of 2.5 (an "A" = 4.0) and completion of 55-60 college credits. The Methods Block Program consisting of five methods courses - Reading, Language Arts, Mathematics, Science and Social Studies - combined with a school based practicum, is scheduled for the term preceeding student teaching. Faculty, all of whom teach the same group of students in any one term, meet periodically to discuss problems and concerns. A regular discussion topic involved students' lack of knowledge in content areas despite having completed two years of a liberal arts education prior to admittance to the upper division School of Education.

Most of the students entering elementary education as juniors have completed the required number of credits in humanities, natural sciences and social sciences as well as an area of concentration in one of these

fields. However, since this distribution did not always ensure an adequate knowledge of the content taught in the elementary school, Block faculty developed an informal testing program during the 1970's. Feedback to students included defining areas of weakness and suggestions for remediation. When another term, the Common Strands, was "blocked" and scheduled to be taken the first term of the junior year, it presented an opportunity to develop and implement a more formal testing program. Results would be shared with students and advisors so that deficiencies could be corrected prior to the Methods Block Term.

Several faculty meetings were devoted to deliberations concerning the proposed testing. The decision resulted in tests traditionally given Block students in the areas of reading, science, social studies and mathematics being retained and others added to determine locus of control, cognitive skills and pupil control ideology. Three types of assessment were included: (1) personality and attitude measures; (2) tests of basic skills; and (3) tests of subject matter achievement.

A combination of standardized and informal diagnostic instruments are given to all students entering the ECEM (Early Childhood, Elementary and Middle School) Program. Table 1 shows the instruments and related content areas.

Table 1

CONTENT/METHODS AREA	STANDARD TEST	INFORMAL DIAGNOSTIC TEST
Reading & Language Arts	NELSON-DENNY READING TEST	Prentice-Hall Diagnostic Instruments Faculty designed tests
Science	STEP II SCIENCE	
Social Studies	IOWA TESTS OF BASIC SKILLS	
Mathematics		Assessment of Competency in Mathematics Taught in the Elementary School

In addition, a course titled "Communications Competencies in Teaching" has been required of all entering juniors. Its purpose is twofold: 1) to diagnose and provide remediation for students in the reading/language arts area and 2) to serve as an introductory course for preservice teachers in communication skills for elementary school children.

Through the use of the testing program we hoped to be able to gain information on; (1) characteristics of students entering the program, (2) the nature and extent of subject matter weaknesses, (3) the need for and nature of remediation, and (4) the relation of subject matter and basic skill achievement to success in methods courses. It should be pointed out that several faculty members felt that remediation should not be a function of a professional program with the suggestions that

such a battery of tests could best serve as a screening device for admittance to the program.

INSTRUMENTS:

I. The Nelson-Denny Reading Test (1973) provides data in basic communication skills. This instrument provides standardized scores on Vocabulary and Comprehension as well as Total Score. Various reviewers (buros) have described the test as being most useful at the college level because of the difficulty of the passages, vocabulary and comprehension. Forms C and D are designed for grades 9 through 16 and are used with self-marking answer sheets. The test takes 30 minutes to administer. The manual discusses the development of the subtests, standardization samples, reliability using the split-halves and equivalent forms methods and provides tables for determining percentile rank. The test is used in our program as a diagnostic tool to determine a student's need for individual tutoring and/or courses in writing, reading and study skills.

Informal tests from the Prentice-Hall Handbook for Writers are used as diagnostic tests in the communication skills course. Spelling, punctuation, capitalization and grammar are tested. Items are keyed to sections in the text/workbook which provide material for remediation. In addition, faculty designed exercises determine a student's skill in listening, oral English pronunciation and usage, informative and creative writing and word recognition. Results from these tests are not included in the results presented in this paper because they

have been used with only one group of students. At the present time, faculty are continuing to explore methods of evaluation.

II. During most of the decade of the 70's an instructor designed science content test was given each term to students in the science methods course as both a pretest and posttest. Each student was given a written prescription indicating areas of deficiency and suggested references for remediation. The instructor used the information gained from the pretest in designing lectures and laboratory experiences in the methods course.

An analysis of the content of elementary school science texts conducted by a graduate student indicated a need to either revise the informal test or use a standarized one. The decision was to use the STEP Science test and to administer it to entering juniors. The Sequential Tests of Educational Progress (STEP II: Science) tests are used to determine general scientific literacy. Test reliability is .71 to .88 for parallel forms and .81 to .91 on K-R 20 tests of internal consistency. Validity data are scanty. Each test item was analyzed and categorized as to whether it fell in the content area (knowledge) or process area. Methods teachers then determined students' weaknesses and designed classes to meet specific needs.

III. Methods course instructors selected the three tests comprising the Work Study Skills section of the Iowa Tests of Basic Skills as the

instrument to assess students' competency in skill areas needed to teach children social science. Map Reading, Reading Graphs and Tables, and Knowledge and Use of Reference Materials are critical skills in today's world of accelerating change. The tests are designed for grades 3-8. An analysis of subtest scores and items enable social studies methods instructors to make their coursework relevant to students' needs in the skill areas tested.

IV. The "Assessment of Competency in Mathematics Taught in the Elementary School" is taken from the booklet Acquiring Competencies to Teach Mathematics in Elementary Schools by L. Y. Hollis and W. Robert Houston (1973). The authors believe an understanding of basic principles of mathematics is essential if the teachers are to provide individualized enriched programs for children (p. 11). They prepared a seven section assessment instrument keyed to pages in references covering basic concepts in mathematics for elementary teachers. When the instructors in the mathematics methods courses checked standardized instruments available through the University's Office of Measurement and Evaluation, this informal assessment was found to be roughly equivalent to eighth grade achievement tests. The faculty then decided to retain the Hollis & Houston measure because we had developed remedial materials keyed to each subsection of the instrument.

V. The assessment of attitudes and personality traits presents a problem in selecting from a large number of potentially relevant variables

those which appear to relate to successful completion of the program and to effective teaching. For this purpose, three measures have been selected on the basis of their potential effect on outcomes. They are (1) attitude toward classroom control; (2) orientation toward reinforcement (locus of control); and (3) cognitive skills.

The Pupil Control ideology (PCI) (Willower, Eidell & Hoy, 1967), designed to measure educator's pupil control ideology along a custodial-humanism continuum, is a 20-item Likert type scale. Lower scores indicate individuals with a more humanistic control orientation. Custodialism is conceived as autocratic, rigid, dogmatic, and closed-minded approach to pupil control. Custodial teachers tend to stereotype students in terms of their appearance, behavior, and parental social status. Humanism is conceived as an interactive pupil-teacher process that promotes pupil self-discipline, two-way communication, and a democratic atmosphere.

According to Rotter (1966), an individual adopts one of two basic orientations toward reinforcement: an internal position that whatever happens is a result of one's ability and effort or an external position, that success or failure is the result of luck, fate, or the actions of powerful others. Substantial research has been conducted with adults using the Rotter Internal-External Control Scale and has been reported by Rotter, Chance, and Phares (1972). This instrument was used to determine students' locus of control and any changes in this trait as they progressed through the program.

Cognitive skills were assessed through the use of the Whimbey Analytic Skills Inventory (WASI) (Whimbey & Lochhead, 1980). This instrument measures the types of skills important to the evaluation of effective thinking and problem solving.

RESULTS

The remainder of this report consists of a review of some of the findings to date. Studies are presently being conducted in greater depth on various components of the methods block and student teaching.

Subjects were undergraduate students entering the teacher certification program in the Early Childhood, Elementary and Middle School Program (ECEM), School of Education, University of Pittsburgh from September 1980 until the present. Most are entering juniors with 55 or more credits earned in the College of Arts and Science at the University or at neighboring community colleges. A few are transfer students from other colleges and universities. A GPA of 2.5 on a 4 point scale is required for admittance. The vast majority are women - only 12 of 123 are male.

Data on entering characteristics were collected from 123 subjects. Correlations with grades in methods courses were based on an N = 80. The difference of 43 includes 18 who dropped out for a variety of reasons including failure to maintain an acceptable GPA (5), transfers to other programs or institutions (5) and 8 who dropped out for financial reasons, etc. The remaining 25 are taking the Methods Block this term or were transfer students who had taken some or all of the methods courses in other institutions.

Table 2, "Entering Characteristics", shows correlations between information available on entering juniors (e.g., GPA from two years in arts and sciences, SAT scores) and tests given in the first or "Common Strands" term. The Pupil Control Ideology (PCI) yields negative correlations (-.03 to -.22) with content tests. Therefore a student having a low PCI score, indicating a humanistic orientation toward pupils, tends to score higher on the content tests. The WASI, which is a test of cognitive skills such as problem solving and reasoning, correlates highly (.54 to .84) with the content tests. The Scholastic Aptitude Test (SAT-Verbal and Math) correlates highly with these same tests. The SAT Verbal exam yields correlations of .78 with the Nelson-Denny Reading test and .48 to .58 with the Science, Math and Social Studies tests.

Our 123 subjects scored an average of 905 on the total SAT which is approximately the national average. Their grade point average as juniors is approximately 3.0 (a "B" average at the University of Pittsburgh). A GPA of 2.5 is required for admission to the School of Education. Table 2 shows a low correlation (.27 and .25) between the GPA and the SAT-Verbal and SAT-Math. This is in contradiction to much research showing a high correlation between SAT scores and college GPA. Perhaps our weaker students avoid scheduling more difficult courses. Other low correlations (-.09 to .20) occur between the GPA earned in two years of liberal arts education and content area tests. Our students can perhaps be characterized as overachievers in the sense that their

ability to do well in terms of grades is not reflected in achievement test scores. The relatively low correlation between entering GPA and scores on content area tests and with GPA average over all methods courses ($r = .22$) suggests that, given a minimum entrance requirement of a 2.5 GPA, GPA is a relatively weak predictor of success in the program.

Table 3 shows correlations between the tests given and the grade point average (GPA) earned in each methods course. In addition correlations are shown for each communications skill test and the total GPA for the five courses comprising the Methods Block program.

The moderately high correlations (.43 and .48) between scores on STEP II science test and informal math instrument and the GPA earned in the science and math methods courses suggest that content background is important in these courses. The low social studies correlation (.10) can be attributed to the very specific skills tested (map and globe usage, reference skills) which comprise only a small part of the methods course content.

The primary value of the testing program to this point has been in the identification of students with severe problems. In some cases additional courses have been required. The most frequent strategy has been for methods instructors to provide additional experiences on an individual basis where needed.

Writing and English usage are areas of much concern. Results in these areas are not reported in this paper since we are still exploring means of assessment.

The ECEM faculty continue to engage in deliberations concerning our testing program. Many feel that the instruments should be administered as part of the admissions process for entering the School of Education. Remediation would then become the responsibility of the student and his/her advisor. Our results indicate that achievement in content area tests are related to success in methods courses and that many students enter the program with marginal competence in subject matter areas.

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Table 2

ENTERING CHARACTERISTICS

	Rotter	PCI	WAS I	NDV	NDC	NDT	Math	SC	SS	GPA	SAT-V	$\bar{x}$	s.d.
Rotter												9.5	4.4
PCI	.17											51.1	7.3
WAS I	-.01	-.40										24.6	6.4
ND - Voc.	-.03	-.29	.61									44.1	7.1
ND - Comp	.09	-.34	.56	.59								44.3	7.3
ND - Total	.02	-.33	.65	.90	.86							44.2	7.3
Math	-.03	-.38	.64	.40	.43	.45						67.0	15.4
Science	-.18	-.28	.54	.53	.49	.56	.48					60.1	12.8
Soc. Studies	-.22	-.57	.84	.67	.64	.71	.75	.74				73.1	13.1
GI (CAS)	.06	-.11	.04	.21	.13	.20	.15	.09	-.09			3.0	0.5
SAT Verbal	-.03	-.35	.63	.71	.67	.78	.48	.58	.50	.27		445	94.2
SAT Math	-.10	-.19	.71	.33	.30	.35	.64	.51	.65	.25	.55	460	93.4

Table 3

Correlations between Tests of Basic Skills and Achievement and GPA in Methods Courses N = 80

	Reading Methods	LA Methods	Total Methods
Nelson-Denny Vocabulary	.28	.13	.21
Nelson-Denny Comprehension	.40	.32	.36
Nelson-Denny Total	.37	.24	.31

	Mean	s.d.	Mean	s.d.	Correlation
Math - Math Methods GPA	69.0	14.5	3.41	0.8	.48
Science - Science Methods GPA	61.0	10.8	3.28	0.7	.43
Social Studies - Social Studies GPA	73.1	14.0	3.61	0.6	.10